No. 641,615. Patented Jan. 16, 1900.

M. M. SUPPES & J. M. DORTCH.

REFRIGERATING SYSTEM.

(Application filed Dec. 27, 1897.)

(No Model.)

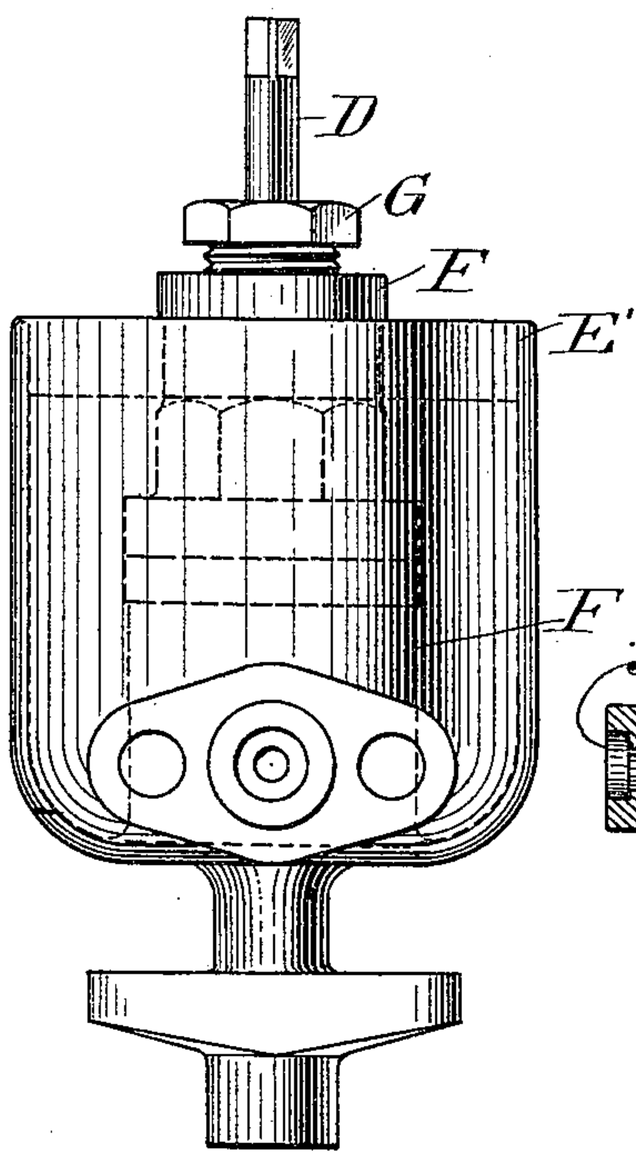

Fig. 1.

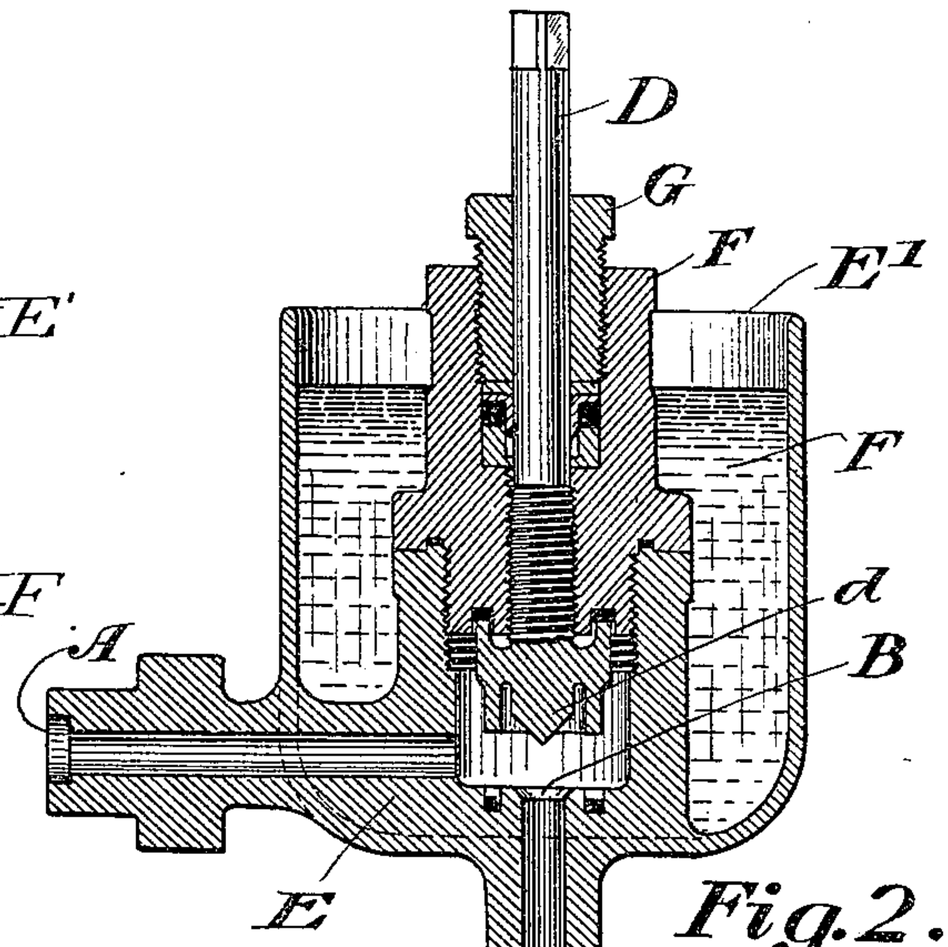

Fig. 2.

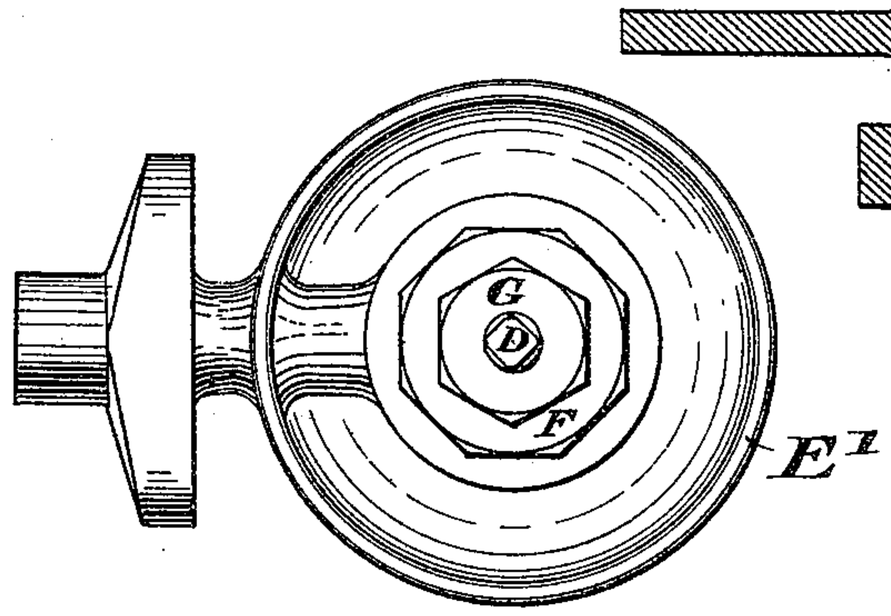

Fig. 3.

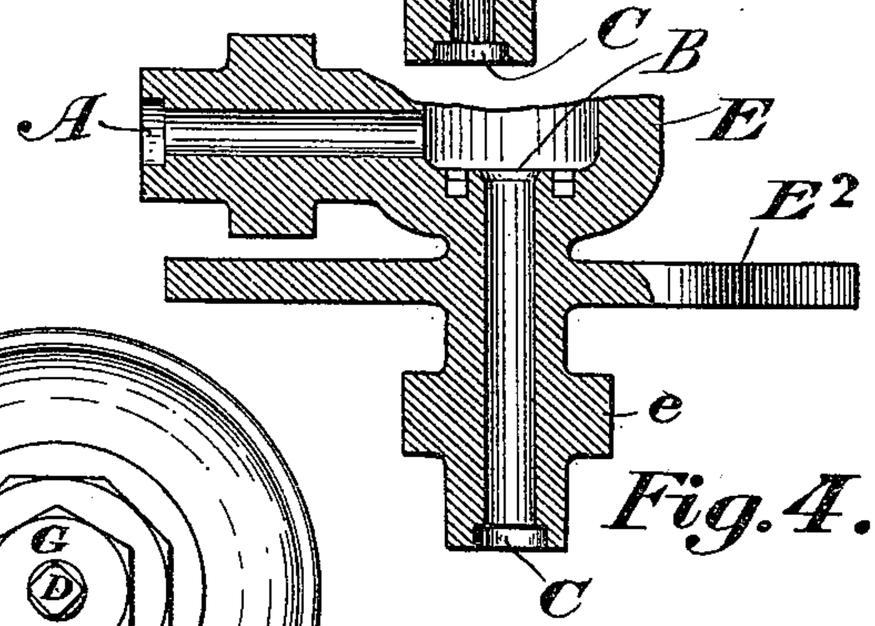

Fig. 4.

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REFRIGERATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 641,615, dated January 16, 1900.

Application filed December 27, 1897. Serial No. 663,776. (No model.)

To all whom it may concern:

Be it known that we, MAXIMILIAN M. SUPPES, of Elyria, in the county of Lorain, and JOHN M. DORTCH, of Cleveland, in the county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Refrigerating Systems, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

Our invention relates to that part of a refrigerating system in which the active element begins to expand from a high pressure to a low pressure.

In the following description of the object and nature of our invention we shall for the sake of brevity and convenience refer to a system in which liquid carbonic acid is the refrigerating element; but it is clear that our invention is equally applicable to systems which use other active elements, such as ammonia.

The object of our invention is to prevent the formation of ice or frozen carbonic acid in the valve or orifice which separates the compression and the expansion sides of the system.

The pipe which is between the expansion-valve and the refrigerating-coil of the usual refrigerating system soon becomes coated with ice or snow. This occurs because the expansion of the carbonic acid absorbs heat from the said pipe, reducing its temperature to such an extent that the moisture of the atmosphere freezes upon it. After a time this also becomes true of that part of the system which directly surrounds the orifice between the two sides of the system, for heat is absorbed from this part of the system both by conduction from the aforesaid pipe and from the expansion of the carbonic acid in proximity to the said orifice. This coating of ice or snow about the casing surrounding the expansion-orifice serves by its heat-insulation properties to maintain the valve-chamber and surrounding parts at an extremely low temperature. The expansion of an element is always accompanied by absorption of heat, and part of this heat may be absorbed from that part of the unexpanded element itself which is immediately behind the expanded portion. Under favorable conditions this may take place to such an extent that it will solidify the unexpanded element. We have found that such conditions are sometimes present in refrigerating systems. At such times as the carbonic acid is expanding very rapidly and the casing surrounding the expansion-orifice is extremely cold the double absorption of heat from the liquid carbonic acid by the expanding carbonic acid and by the surrounding casing so lowers the temperature of the liquid carbonic acid that solid carbonic acid is formed, which chokes the expansion-orifice. We have found that it is only the coaction of the ice-covered casing and the rapid expansion of the carbonic acid that causes this difficulty, for at such times as the expansion-orifice has become closed in this manner we have been able to quickly melt the obstruction by removing the ice or snow from the casing surrounding the expansion-orifice.

It is, therefore, the object of this invention to provide means whereby the formation of ice or snow on the outside of the expansion-valve may be prevented, and such means we describe in the following specification and show in the accompanying drawings.

Referring to the drawings, Figure 1 is a side elevation of an expansion-valve which embodies the principles of our invention. Fig. 2 is a vertical section through the center of the same. Fig. 3 is a plan view of the same. Fig. 4 is a partial section showing a modified form of our invention.

The liquid carbonic acid from the condenser enters the expansion-valve at A, passes through the orifice B, expanding as it passes through the said orifice, and passes out of the expansion-valve, as at C, to the expansion-coils of the system. The condenser, expansion-coils, and other parts of the system are too well known to require illustration or description.

D is the valve-stem, which is shown in its raised position. Ordinarily this stem would be lowered sufficiently to partially close by means of its tapered lower end *d* the orifice B.

We have shown a valve of a specific construction comprising the members E, F, and G, secured together to form the casing and pro-

vided with suitable packing. As the mechanical construction shown does not form any part of our invention and is one that is familiar to those skilled in the art, we do not here describe it in detail.

To the member E we secure the vessel E′, preferably by forming a unitary casting comprising both E and E′. This vessel surrounds the valve-casing and is partially filled with a heavy oil F. This oil should be a fairly good heat-conductor and should have a low freezing-point.

By the provision of the vessel containing oil no congealed insulator can form on the outside of the valve-casing until the temperature falls to the freezing-point of the oil F. This need not occur in practice. Moreover, the large area of the cup E′ and the oil F enables them to absorb and convey to the valve-casing sufficient heat to keep the temperature within the valve well above that at which there is danger of solidification occurring therein.

In Fig. 4 we show a modified form of our invention which is somewhat simpler than the previous form, but which we have found to be thoroughly efficient in practice. In this form we do not increase the heat-absorption area directly around the valve-casing, but we form the lower member of the valve-casing E with a wide collar E^2, which we place directly below the orifice B and between it and the pipe *e*, which leads to the expansion-coil. This arrangement is efficient because no ice or snow would form on the valve-casing if it were not that the cold pipe E absorbs much heat from the casing E. By the provision of the collar E^2 in substantially the position indicated sufficient heat is absorbed from the air through the collar to prevent the ice or snow from creeping upward over the valve-casing.

While we have only shown two modifications of our invention, it must be obvious that other specific modifications will suggest themselves to those skilled in the art, and we do not, therefore, desire to be limited to the specific means shown nor to the use of our invention with any particular type or system of expansion-valve. Even if a valve were dispensed with our invention would be equally applicable if only the heat-absorbing area which I provide is located in conjunction with that part of the system in which the active element begins to expand.

Having thus described our invention, what we claim, and desire to protect by Letters Patent, is—

1. A valve-casing member, as E, containing the expansion-orifice of a refrigerating system, and comprising a passage from the high-pressure side of the system to the said orifice and a short pipe member leading from said orifice, in combination with a heat-absorbing member of comparatively large area secured to the outside of the valve-casing member and adapted to prevent the formation of ice thereon.

2. A valve-casing member, as E, containing the expansion-orifice of a refrigerating system, and comprising a passage from the high-pressure side of the system to the said orifice, and a short pipe member leading from said orifice, in combination with a heat-absorbing member of comparatively large area secured about the said pipe member and closely adjacent to said orifice and adapted to prevent the formation of ice on the valve-casing member.

3. A valve-casing member, as E, containing the expansion-orifice of a refrigerating system and comprising a passage from the high-pressure side of the system to said orifice and a short pipe member leading from said orifice in combination with a collar of comparatively large area secured about the said pipe member in close proximity to said orifice and adapted to prevent the formation of ice on the outside of the said valve-casing member.

4. In a refrigerating system, the combination with an expansion-valve and its casing having a pipe member connecting the expansion-orifice of said valve to the refrigerating-coil, of an ice-guard for said valve, comprising a member of comparatively large area secured to the outside of the valve-casing adjacent to the valve, said member performing the double office of absorbing heat from the atmosphere and thereby prevent undue reduction of the temperature of the valve-casing, and of a barrier over which the ice accumulating on the pipe member must creep in order to reach that portion of the casing which intermediately surrounds the valve, substantially as described.

In testimony whereof we have affixed our signatures in the presence of two witnesses.

MAXIMILIAN M. SUPPES.
JOHN M. DORTCH.

Witnesses:
JOS. H. CRAIG,
G. M. FERGUSON.